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THE LANGLEY DAAC newsletter

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First CERES Mission Begins

The Tropical Rainfall Measuring Mission (TRMM) was successfully launched November 27th at 4:27 p.m. EST from the Japanese Space Center at Tanegashima. The TRMM satellite was built at NASA Goddard and launched by the National Space Development Agency (NASDA) on a Japanese H-II rocket. One of the scientific instrument packages on TRMM is the Clouds and the Earth's Radiant Energy System (CERES) provided by the NASA Langley Research Center.

The CERES investigation is led by Langley's Atmospheric Sciences Division (ASD) and is one of the highest priority scientific satellite experiments in NASA's Mission to Planet Earth Program. The TRMM CERES experiment is the first of several planned flights of CERES instruments designed to provide information critical for understanding cloud-radiation effects on climate change and improving climate model predictions of global change. CERES will measure solar-reflected and Earth-emitted radiation to determine the radiation budget throughout the atmosphere and will provide key cloud properties using simultaneous measurements by other instruments. A CERES web page containing more detailed information is available at:

http://asd-www.larc.nasa.gov/ceres/ ASDceres.html

The CERES Team and the Langley DAAC started up operations with the successful activation of the CERES instrument on Tuesday, December 2. A detailed instrument check-out period was begun with internal calibrations in both biaxial and cross-track scan modes and tests of gimbal motion. The initial check-out period continued until the instrument covers were opened on December 27. The first CERES data were received at the Langley DAAC for processing in the Langley TRMM Information System (LaTIS) on December 2. Level 0 processing at Goddard and DAAC processing of the CERES Instrument subsystem quickly produced science data products which demonstrated that both the instrument and the initial engineering and test operations were working correctly. Although initial data was limited to internal measurements until the covers were opened, everyone involved was thrilled to see actual data from the instrument in space.

The opening of the CERES instrument covers on December 27 started the initial science check-out period with the first deep-space calibration look scheduled for early January 1998. Initial processing will focus on the instrument evaluation and on processing of an initial set of products for comparison with data from the earlier Earth Radiation Budget Experiment (ERBE). Further information on general data availability will be provided through the Langley DAAC web site at:

http://eosweb.larc.nasa.gov

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The Langley ECS Overview

The Langley DAAC is an active partner in the Earth Observing System Data and Information System (EOSDIS). The goal of EOSDIS is to provide earth sciences researchers and the general public enhanced access to new and historical data such as clouds, atmospheric chemistry, vegetation, and global snow and ice cover.

The EOSDIS Core System (ECS), a major component of EOSDIS, will support this goal, providing EOS spacecraft and instrument command and control and the capability to process, manage, maintain, and distribute the EOS data products and other selected earth science data sets. A broad range of desktop services will be available for distributed data search, browse, and order, promoting effective use of our national earth science data holdings.

The Langley ECS supports three instruments to be launched in June 1998 on the EOS AM-1 platform: Clouds and the Earth's Radiant Energy System (CERES), the Multi-angle Imaging SpectroRadiometer (MISR), and Measurement Of Pollution in The Troposphere (MOPITT). Data from these intruments will be processed, archived, and distributed by the Langley ECS. In addition, the system will archive and distribute data for the Stratospheric Aerosol and Gas Experiment III (SAGE III) instrument to be launched on the Russian METEOR-3M satellite in May 1999.

These instruments will provide new data within the science disciplines supported by the Langley DAAC: radiation budget, clouds, aerosols, and tropospheric chemistry.

Two operational prototypes of the Langley ECS have been delivered and tested: Interim Release 1 (IR-1), delivered in early 1996, and the ECS Pre-Release B Testbed, delivered in April 1997.

The goal of both prototypes was to provide early software interface testing at defined stages of the instrument teams' science software development. This interface testing, called Science Software Integration and Test (SSI&T), consists of four phases: delivery planning, pre-delivery testing, formal delivery and testing, and post-SSI&T wrap-up.

During the delivery planning phase, the DAAC mission support staff works with each Instrument Team (IT) to schedule hard-

(See ECS Overview on Page 2)

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GTE Data Sets Used in Climatologies Study

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The Langley ECS Overview (continued)

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GTE Data Sets Used in Climatologies Study

A 1997 article "Climatologies of NO_x and NO_y: A Comparison of Data and Models" by L. K. Emmons, et al., appeared in the Atmospheric Environment journal. Data sets from the Global Tropospheric Experiment (GTE) archived at the Langley DAAC were among those used in this study. In particular, the ABLE-3A and ABLE-3B (Atmospheric Boundary Layer Experiment) data sets were used and provided valuable information about NO_x in the arctic and subarctic regions of North America in the lower half of the troposphere. The abstract, which follows, is reprinted from Atmospheric Environment, vol. 31, pp. 1851–1904, Copyright (1997), with kind permission from Elsevier Sciences, Ltd., The Boulevard, Langford Lane, Kidlington 0X5 1GB, UK.

ABSTRACT—Climatologies of tropospheric NO_x ($NO + NO_2$) and NO_y (total reactive nitrogen: $NO_x + NO_3 + 2 \times N_2O_5 + HNO_2 + HNO_3 + HNO_4 + ClONO_2$ + PAN (peroxyacetylnitrate) + other organic nitrates) have been compiled from data previously published and, in most cases, publicly archived. Emphasis has been on non-urban measurements, including rural and remote ground sites, as well as aircraft data. Although the distribution of data is sparse, a compilation in this manner can begin to provide an understanding of the spatial and temporal distributions of these reactive nitrogen species. The cleanest measurements in the boundary layer are in Alaska, northern Canada and the eastern Pacific, with median NO mixing ratios below 10 pptv, NO_x below 50 pptv, and NO_y below 300 pptv. The highest NO values (greater than 1 ppbv) were found in eastern North America and Europe, with correspondingly high NO_y (~5 ppbv). A significantly narrower range of concentrations is seen in the free troposphere, particularly at 3–6 km, with NO typically about 10 pptv in the boreal summer. NO increases with altitude to ~100 pptv at 9–12 km, whereas NO_y does not show a trend with altitude, but varies between 100 and 1000 pptv. Decreasing mixing ratios eastward of the Asian and North American continents are seen in all three species at all altitudes.

Model-generated climatologies of NO_x and NO_y from six chemical transport models are also presented and are compared with observations in the boundary layer and the middle troposphere for summer and winter. These comparisons test our understanding of the chemical and transport processes responsible for these species distributions. Although the model results show differences between them, and disagreement with observations, none are systematically different for all seasons and altitudes. Some of the differences between the observations and model results may likely be attributed to the specific meteorological conditions at the time that measurements were made differing from the model meteorology, which is either climatological flow from GCMs or actual meteorology for an arbitrary year. Differences in emission inventories and convection and washout schemes in the models will also affect the calculated NO_x and NO_y distributions.

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ECS Overview

(continued from page 1)

ware and staff resources, and to solidify the delivery and test procedures.

In pre-delivery testing, members of the instrument software team access the system from their science computing facility and perform preliminary software checkout on the DAAC hardware. This identifies and resolves early incompatibilities between the development platform at the science computing facility and the production hardware at the DAAC.

The following activities take place during the formal delivery and testing phase: verification of the delivered software package; configuration management of the delivery; standards checking of the software; build and test of the software as performed at the science computing facility; registration of the software in the production processing system; and test of the software through the ECS Planning and Data Processing System. Members of the instrument software team work directly on-site with the DAAC mission support team.

When formal SSI&T is complete, the DAAC and the instrument team participate in wrap-up sessions to identify areas for improvement. To obtain a copy of the "Lessons Learned" document for the Langley Testbed, contact the Langley DAAC User and Data Services office.

The first ECS delivery, IR-1, supported SSI&T for the pre-launch release of the CERES software for the Tropical Rainfall Measuring Mission (TRMM), and also supported SSI&T for the EOS AM-1 beta software releases of MISR and MOPITT. Having successfully performed its mission, IR-1 was decommissioned in December 1996.

The second ECS delivery, the Pre-Release B Testbed, added automated job planning and preliminary data archive components to the system capabilities, and supported SSI&T for the launch-ready version of CERES, and the pre-launch versions of the MISR and MOPITT science software.

MOPITT completed SSI&T of its first delivery in June. The MISR SSI&T was performed in two stages: phase one was completed in July, and phase two was completed in October. Formal testing of delivered CERES software com-ponents was completed in August 1997.

For more information on the EOS project, EOSDIS, or ECS, visit the EOS home page at:

http://eos.nasa.gov

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Staff Presentations at AMS Meeting

Two staff members from the Langley DAAC will be presenting papers at the 78th Annual Meeting of the American Meteorological Society in Phoenix, Arizona.

In concert with the Tropical Rainfall Measuring Mission (TRMM) launch, John O. Olson will be presenting an overview of the NASA Langley TRMM Information System (LaTIS). LaTIS is being implemented at the Langley DAAC to ingest the Level 0 instrument and ancillary data; provide the processing of the higher level data products; generate the necessary metadata files; archive the data products; provide users the ability to search the holdings via a Web interface; subset the archive data files; allow for standing orders for future data products; and distribute the data to users. The System is designed to comply with the EOSDIS Version 0 Functional Requirements and additional requirements from the CERES instrument teams. Reuse of the Version 0 components, maximum use of commercial-off-the shelf software to automate processes, and frequent interactions with customers ensures that LaTIS will provide the science community with an intuitive and easily accessible interface to the Langley DAAC's CERES data holdings.

Kathleen L. Morris will be presenting a paper on the long-term radiation budget data available from the EOSDIS Langley DAAC. The presentation will focus on the Nimbus-7 Earth Radiation Budget (ERB) data sets (1978 to 1987), the Earth Radiation Budget Experiment (ERBE) data sets (1984 to present), and the Clouds and the Earth's Radiant Energy System (CERES) data sets beginning in 1998, which together comprise over 20 years of radiation budget data applicable to global change studies. These data products constitute a long-term record of energy flux measurements, and with the new CERES instrument on the TRMM and the planned launches of additional CERES instruments on the EOS AM1 and EOS PM1 satellites, these records will continue well into the next decade.

For more information on the long-term radiation budget data products or the LaTIS project, contact the Langley DAAC User and Data Services office.

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Phase 4 of S'COOL a Success

The October test phase of the S'COOL Project was very successful, with about 30 schools participating. Three European countries (France, Sweden, and Switzerland) along with 10 states in the U.S. were represented during this phase. Participants tested Internet interfaces for determining satellite overpass times, for recording observations in the database, and for retrieving observations from the database. The students discovered a number of problems which are being corrected in preparation for expanding participation in the operational phase of the project.

The S'COOL Project received international publicity with articles appearing in one Swedish and three French newspapers. It was also featured in the class journal of a grade school in Paris, and on the web sites at several of the European schools. An Internet conference was held with three schools in France during the week of observation.

S'COOL observations (187 have been recorded to date) are now available in a database which can be queried over the Internet, and satellite photos for the October observation week have also been made available to the students.

Actual CERES data will be used for the operational phase of S'COOL which begins in February 1998.

A paper describing the development of the S'COOL Project will be presented at the 7th Symposium on Education of the American Meteorological Society in January 1998. An earlier paper describing the concept of the project appears in Chambers et al, "CERES and the S'COOL Project," [Sixth Alumni Conference of the International Space University, Houston, TX, NASA Conference Publication 3355, July 11, 1997, pp150-157.]

[Photo courtesy of Jeff Caplan, NASA LaRC]

Dr. Lin Chambers, (S'COOL Project Coordinator/Langley DAAC Project Scientist), along with Stephanie Weckmann, Dave Young, and others, discussing the S'COOL project with French students during Internet conference.

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Long-time DAAC Manager Retires

Roy Dunkum, the Langley DAAC Manager since the beginnings of EOSDIS, retires on January 3 after nearly 45 years of Federal service. Roy first came to Langley Research Center as an apprentice in 1949 and returned in 1958 after a stint in the Navy and graduating from Virginia Tech. During his career, he has been a part of many of the significant computer enterprises at the Center. From management of the Central Data Recording Complex which served more than 20 wind tunnel sites to responsibility for the operations of the Langley Central Scientific Computing Complex including support for ERBE processing, Roy has "seen it all."

One of the original EOSDIS DAAC Managers, Roy has been a strong and steadying influence in the long evolution of EOSDIS. He has led the DAAC through development of the Version 0 system we have today to the initial operation of the LaTIS system for TRMM and to the threshold of operations of the ECS system for AM-1. The DAAC facility itself was made possible through his planning and advocacy. Although we will greatly miss Roy and his steady good humor, he has certainly earned the opportunity to start a new career at home under the guidance of Helen, his wife of 46 years. Best wishes from all of us!

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The Langley DAAC Newsletter is a quarterly publication of the Langley Distributed Active Archive Center, NASA Langley Research Center, Hampton, VA 23681-2199. Contributions, comments, or questions may be submitted to the editor via e-mail (userserv@eosdis.larc.nasa.gov) or by contacting the Langley DAAC User and Data Services office by phone at (757) 864-8656 or by FAX at (757) 864-8807.

DAAC Manager • Roy Dunkum
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The Langley DAAC provides multiple interfaces to access its data holdings. The graphical and character user interfaces allow users to search and order data; and web interfaces allow direct access to some data holdings for immediate downloading or placing media orders, for searching the data holdings and downloading electronically available holdings, and for ordering prepackaged CD-ROMs and videocassettes. All of these methods are easily accessible from the Langley DAAC web site at:

http://eosweb.larc.nasa.gov

EOSDIS Conference Exhibits

January 12–15, 1998
AMS
(American Meteorological Society)
78th Annual Meeting
Phoenix, Arizona

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April 16–19, 1998
NSTA
(National Science Teacher's Association)
46th Annual Convention
Las Vegas, Nevada

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June 7–10, 1998
SLA
(Special Libraries Association)
89th Annual Conference)
Indianapolis, Indiana

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